TSG

SPECIAL EQUIPMENT SAFETY TECHNICAL SPECIFICATION

TSG N0001-2017

Special purpose motor vehicles in defined fields safety and technical supervision regulation

场（厂）内专用机动车辆安全技术监察规程

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1 General

1.1 Purpose

In order to ensure the safe use of special motor vehicles in the defined field, prevent and reduce accidents, protect people's lives and property, and promote economic and social development, this regulation is formulated in accordance with the "Special Equipment Safety Law of the People's Republic of China" and the "Regulations for Safety Supervision of Special Equipment".

1.2 Meaning and scope of application

In accordance with the Special Equipment Catalogue, special motor vehicles in a defined field (hereinafter referred to as field vehicle) refer to special motor vehicles that are used only in specific areas such as factories, tourist attractions, and playgrounds, except for road traffic and agricultural vehicles. It includes mobile industrial vehicles and off-road tourist sightseeing vehicles.

1.2.1 Mobile industrial vehicles

In this regulation, a motorized industrial vehicle is a forklift. Forklift is a self-propelled vehicle that lifts the load to a certain height and carries out stacking operations through a gantry and a fork, it includes a counterweight type forklift, a reach type forklift, a side forklift, a straddle forklift, a pallet stacker, and three-way stacker.

Note 1-1: The forklift specified in this regulation does not include a detachable attachment.

1.2.2 Off-road tourist sightseeing vehicles

Off-road tourist sightseeing vehicles (hereinafter referred to as sightseeing vehicles) include sightseeing vehicles and sightseeing trains.

Sightseeing vehicles are trackless, non-trolley, non-enclosed, self-propelled vehicles with 4 or more wheels (including 4), including battery sightseeing vehicles and internal combustion sightseeing vehicles.

Sightseeing train refers to a trackless, non-trolley, non-enclosed, self-propelled passenger vehicle that includes 8 or more (including 8), composing one tractor

brake device, and shall be directly operated by the driver;

(7) The number of wheels of the tractor head and each compartment of the sightseeing train shall be greater than or equal to 4.

2.2 Design

2.2.1 General requirements

(1) There shall be a complete, correct, and uniform design document. The design document shall include the design mission statement, design calculation book, design drawings, schedules, use maintenance instructions, and main parameter tables;

(2) Forklifts shall be left with the location where the license plate is to be installed. The sightseeing vehicle shall be left with the location for the installation of the front and rear license plates. The dimensions of this location shall comply with the requirements of the “Regulations for the Use of Special Equipment” (TSG 08-2017);

(3) Each compartment of the sightseeing vehicle and sightseeing train shall be provided with a location for fixing and storing the fire extinguisher, and it is easy to access;

(4) The lateral stability angle of the sightseeing vehicle under no-load condition is not less than 35°;

(5) The stability of the forklift shall meet the requirements of the relevant stability verification test;

(6) Forklifts with explosion-proof functions shall meet the requirements of GB 19854-2005 “General rules of explosion-proof techniques of industrial trucks for explosive atmospheres”, GB/T 26950.1-2011 “Explosive-proof industrial trucks - Part 1: Battery-operated industrial trucks”, GB/T 26950.2-2015 “Explosive-proof industrial trucks—Part 2: Internal combustion industrial trucks”.

2.2.2 Main load-bearing structural components

2.2.2.1 Forklift

The main load bearing structural components of forklift trucks include frames, masts, fork frames, and forks, which shall meet the following requirements:

(1) When the forklift carries 1.33 times the rated lifting weight or eccentric load, the main load bearing structural components have sufficient strength and rigidity;

combustion forklifts shall avoid causing discomfort to the operator;

(4) The battery forklift shall have a space of 30 mm or more between the metal cover plate of the battery and the live part of the battery. When there is an insulation layer between the cover plate and the live part, the gap is at least 10 mm;

(5) The internal combustion forklift shall select the engine that meets the requirements of the relevant emission standards;

(6) For the forklifts with explosion-proof function, the installed internal combustion engine shall comply with GB 20800.1-2006 “General rules of explosion-protect techniques of reciprocating internal combustion engines for explosive atmospheres - Part 1: Group II engines for use in flammable gas and vapor atmospheres”, GB 20800.2-2006 “General rules of explosion-protect techniques of reciprocating internal combustion engines for explosive atmospheres - Part 2: Group II engines for use in flammable dust atmospheres”.

2.2.4.1.2 Sightseeing vehicles

(1) The maximum climbing grade designed for the sightseeing vehicle shall not be less than 15%;

(2) The maximum climbing grade designed for the sightseeing train shall not be less than 7%;

(3) The rated load is calculated by multiplying the rated number of passengers by 85 kg (Note 2-1).

Note 2-1: The total weight of each passenger is calculated as 85 kg. The weight of each passenger is 75 kg, and the sum of the average weight of each passenger’s hand-carried and carry-on baggage is 10 kg.

2.2.4.2 Forklift transmission system

(1) For mechanical transmission forklifts, shifters shall have synchronizer;

(2) For hydraulic transmission forklifts, it shall have inching function;

(3) For static pressure transmission forklift, the engine can only be started when it is in braking state;

(4) The internal combustion forklift shall be equipped with a device that prevents the engine from starting when the transmission is engaged.

2.2.4.3 Steering and operation systems

2.2.4.5.2 Forklift

(1) The performance of the brake shall comply with GB/T 18849-2011 “Powered industrial trucks - Brake performance and component strength”;

(2) Forklifts that use pedals to operate the operation and brake control devices shall comply with GB/T 26562-2011 “Construction and layout of pedals of self-propelled sit-down rider-controlled industrial trucks - Rules for the construction and layout of pedals”.

2.2.4.5.3 Sightseeing vehicles

(1) The service brake system shall use double pipes or multiple pipes;

(2) Braking force shall ensure that the braking distance and braking stability meet the requirements of clause 5.5.7 in GB/T 21268-2014 “General technical conditions for garden patrol minibus”;

(3) The braking force can ensure that the vehicle is parked in the up and down direction of the maximum climbing grade under the condition of rated load;

(4) The braking force can ensure that it can make parking the braking in the downward direction of the designed maximum climbing gradient at the rated load and the maximum operating speed.

2.2.4.6 Electrical and control systems

2.2.4.6.1 General requirements

(1) The switching device shall be set up for start-up of the field vehicle, which may only be started by a key, password or magnetic card;

(2) The battery field vehicle’s control system shall have undervoltage, overcurrent, overheating and overvoltage protection functions;

(3) The electric system of the battery field vehicle shall adopt a two-wire system to ensure good insulation, and the control part shall be reliable.

2.2.4.6.2 Forklift

(1) The counterbalanced forklift shall be equipped with headlamp, brake lights, turning signal lamps, and other lighting and signaling device, other forklifts shall be equipped with the lighting and signaling devices based on the conditions of use;

(2) The battery forklift shall be provided with an emergency power off switch that is not automatically reset but can cut off the total control power supply,

lateral slipping and falling off of the cargo forks;

(3) Forklifts with explosion-proof function shall have the function of mechanical explosion protection. Sparks shall not be generated on all surfaces of working devices that come into contact with or may contact the ground or the load. Materials used shall be copper, copper-zinc alloys, stainless steel, etc., or they shall be wrapped by non-metallic material (such as rubber or plastic).

2.2.5 Safety protection devices

2.2.5.1 General requirements

The field vehicle shall be equipped with warning devices and rearview mirrors that can emit clear sound.

2.2.5.2 Forklift

(1) Safety belts and other restraint devices shall be installed on the driver's position of a seated vehicle;

(2) The top guard shall meet the requirements of GB/T 5143-2008 “Industrial trucks - Overhead guards - Specification and testing”;

(3) A falling speed limiting device and a self-locking device for the gantry shall be provided. If the falling speed limiting valve and the lifting cylinder are connected by a hose, there shall also be a device for preventing the hose from breaking;

(4) The lifting device shall be provided with the overtravel prevention device and limiter, to avoid accidental detachment of the moving parts from the fork carriage and the gantry;

(5) Retaining racks and wheel guards shall comply with the requirements of clause 4.7.5 and clause 4.9.2 of GB 10827.1-2014 “Industrial trucks - Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks and burden-carrier trucks”;

(6) For the forklift battery, the battery insulation resistance is not less than 50Ω multiplied by the rated voltage of the battery pack (unit is V), the insulation resistance of other electrical equipment is not less than 1kΩ multiplied by the battery pack rated voltage value;

(7) In the case of open type rim and pneumatic tires, the structure shall be such that the rim bolts are loosened only after the wheels have been removed from the vehicle.

(3) Equipment, facilities, and workplaces that are compatible with production;

(4) Sound quality assurance system, safety management and post responsibility system;

(5) The forklift manufacturing organization shall have the test and inspection device for the whole vehicle, including at least braking performance test instruments or devices, standard loads, test ramps, etc.;

(6) The manufacturing organization of the sightseeing vehicle shall have the test and inspection device for the whole vehicle, including at least the braking performance test instrument or device, test ramp, and lateral rolling performance test device.

2.3.2 Process documents and job instructions

The manufacturing and repairing organization shall, in accordance with the design documents, formulate a complete process document and work instructions (blanking, machining, welding, assembly, spraying, incoming inspection, process inspection, exit-factory inspection, etc.) to meet the requirements of safety technical specifications and relevant standards, design files.

2.3.3 Manufacturing, retrofitting, repair process and records

2.3.3.1 General requirements

(1) The manufacturing and repairing organization shall, in accordance with the requirements of the process documents and work instructions, carry out the manufacturing, retrofitting and repair activities and record them;

(2) The manufacturing organization shall record the traceable information of the main components such as the frame, motor, engine, and controller;

(3) The manufacturing organization shall number the frame of the field vehicle; the frame number shall be unique and marked on the obvious position of the frame for easy identification.

2.3.3.2 Production of main load bearing structural components

2.3.3.2.1 Welding procedure qualification

The welding procedure documents shall be prepared prior to the welding of the main load bearing structural components. In any of the following cases, welding procedure qualification shall be carried out in accordance with relevant regulations:

(1) In case of first execution of the welding procedure;

(4) The tire specifications and patterns on the same axle shall be the same, and the tire specifications meet the design requirements;

(5) The knuckle and arm in the steering device, the steering crossbar, the straight bar, and ball pin shall not have cracks or damage. The crossbar and straight bar are not allowed to have butt welding, and the ball pin shall not be loosened;

(6) When the forklift is traveling at the maximum speed in a straight line, there shall be no obvious crawling phenomenon;

(7) The sealing parts of the ball joints of the suspension system for sightseeing vehicles shall not have incisions and cracks, the stabilizing bar shall be connected reliably; the structural parts shall not be deformed or damaged;

(8) The shock absorbers for sightseeing vehicles are complete and effective, and there must be no obvious leakage of oil;

(9) There is no deformation and crack in the front and rear axles of sightseeing vehicles;

(10) When the sightseeing vehicle travels along a straight line at a speed of 15 km/h (if the maximum design speed is less than 15 km/h, use the maximum speed) and the steering wheel remains stationary, there shall be no obvious crawling phenomenon;

(11) The sightseeing vehicles travel on flat, hard, dry, and clean cement asphalt roads at a speed of 10 km/h, when it transits from the straight line travelling to the circumferential driving having a diameter of 24 m at the driving speed of 10 km/h within 5 s, the tangential operating force on the external edge of the steering wheel is not more than 150 N;

(12) When the sightseeing vehicle is at the maximum turning, the steering wheel shall not have obvious lateral slip.

2.3.4 Accompanying files

At the time of exit-factory, the field vehicle shall be accompanied by relevant technical materials and documents such as the main design drawings, product quality certifications, and the use & maintenance instructions.

2.3.4.1 Major design drawings

The main design drawings, including the general map (or vehicle schematics), brake schematics, electrical schematics, hydraulic or pneumatic system schematics.

number, and relevant changes.

Organizations engaged in retrofitting and repairing shall perform self-inspection after the retrofitting and repairing of the field vehicles, the self-inspection report shall be handed over to the using organization for archiving.

After the retrofitting of the field vehicle, it shall be subject to the first inspection, and only qualified vehicles after changing of use registration can be put into use.

3 Safety management of use

3.1 Basic requirements

3.1.1 Basic requirements for user organization

The user organization shall comply with the provisions of the “Regulations for the Use of Special Equipment” and shall also meet the following requirements:

(1) Obtain a business license;

(2) Be responsible for the safety of the use of field vehicle in its area;

(3) In accordance with the use of the vehicle, the use environment, choose the field vehicles which are suitable for the conditions of use, and be responsible for the type selection of purchased field vehicles;

(4) When purchasing a sightseeing vehicle, ensure that the design climbing gradient of the sightseeing vehicle can meet the requirement of the maximum gradient in the use of the organization’s driving route, and be clearly stated in the sales contract;

(5) Before the field vehicle is put into use for the first time, apply for the first inspection to the special equipment inspection institute in the place where the ownership company is located;

(6) One month prior to the expiry of the validity period of the inspection, submit a regular inspection application to the special equipment inspection institute, accept the inspection, and do the cooperative work related to the regular inspection;

(7) During the period of use of the field vehicle for mobile operations, perform regular inspections at the place of use or at the place of use registration;

(8) Formulate safe operating procedures, including at least the requirements for seat belts, turning slowdown, downhill deceleration, and ultra-high speed limit;

inspection at least once a month for the field vehicle, conduct a comprehensive inspection once a year, and maintain the normal state of use of the field vehicle; routine maintenance and self-inspection and comprehensive inspection shall be performed in accordance with relevant safety technical specifications and the requirements of the product use & maintenance instructions. If abnormal conditions are found, they shall be dealt with in a timely manner, and be recorded and kept in safety technical files. Routine maintenance, self-inspection and comprehensive inspection records shall be kept for at least 5 years.

(2) Before the field vehicle is put into use daily, the user organization shall carry out the trial operation inspection and take record in accordance with the requirements of the use & maintenance instructions. In the process of use, the user organization shall strengthen the patrol inspection of the field vehicle and record it;

(3) In the event of a breakdown or abnormal situation of the field vehicle, the user organization shall stop using it, conduct a comprehensive inspection of it, eliminate hidden accidents, record it, and keep the record in the safety technical file;

(4) Routine maintenance and self-inspection of field vehicles shall be carried out by the field vehicles operators of the user organization. Comprehensive inspection shall be carried out by the field vehicle safety management personnel of the user organization, or entrusted to other professional organizations to implement; if entrusted to other professional organizations, it shall sign the corresponding contract to clarify the responsibility.

3.2.2 Routine maintenance, self-inspection and comprehensive inspection

The user organization shall select items for routine maintenance, self-inspection, and comprehensive inspection based on the specific types of forklifts and sightseeing vehicles, in accordance with relevant safety technical specifications and relevant standards, and requirements for the use & maintenance. The user organization can determine the cycle and content of the routine maintenance, self-inspection and comprehensive inspection that are higher than the requirements of this regulation, based on the heavy use of the field vehicle and the environmental conditions.

The basic requirements for the relevant items and its contents are as follows:

(1) Routine maintenance of the field vehicle in use includes at least the main load bearing structural components, safety protection device, working mechanism, operating mechanism, electrical (hydraulic, pneumatic)

(1) Design document review (design task book, design calculation book, main design drawings, use & maintenance instructions, etc.), data verification (manufacturing permit, type test certificate, product quality certificate, use & maintenance instructions, etc.);

(2) Structure type inspection, appearance inspection of the entire vehicle, inspection of main load bearing structural components, inspection of major components, inspection of nameplates and safety warning signs;

(3) Measurement of main parameters, including rated lifting capacity, lifting height, length, width, height and wheelbase, tread, front suspension distance, etc.;

(4) Determination of vehicle self-weight;

(5) Inspection of power systems, transmission systems, driving systems, steering and operating systems, hydraulic systems, braking systems, electrical and control systems, and working devices;

(6) Safety protection and protective device inspections;

(7) Operational environment inspection;

(8) Performance tests, including handling performance, steering performance, running performance, dynamic performance, braking performance, stability test, explosion-proof performance test, electrical safety test (battery forklift);

(9) Noise test;

(10) Safety protection and protective device tests;

(11) Strength test of main load bearing structural components;

(12) Strengthen test, for the internal combustion forklift with rated weight less than or equal to 10 t, it shall be not less than 400 hours; for the battery forklift, it shall not be less than 200 hours; for the forklift with the rated capacity greater than 10 t and not greater than 25 t, it shall be no less than 100 hours; for forklift with a rated lifting capacity of more than 25 t, it shall be not less than 60 hours.

4.2.2 Sightseeing vehicles

(1) Design document review (design task book, design calculation book, main design drawings, use & maintenance instructions, etc.), data verification (manufacturing permit, type test certificate, product quality certificate, use & maintenance instructions, etc.);

be separated, there is net height more than or equal to 900 mm above each seat cushion. The net height refers to the shortest distance from the plane where the highest point of the un-depressed cushion is located to the roof. The sightseeing train is subject to structural strength tests on each compartment, the curb mass is their own mass.

Note 4-2: In the type test, the maximum slope downhill stop test shall be selected on a test ramp that satisfies the test conditions. During the test, under the condition of rated load, maximum running speed and maximum designed climbing grade, the sightseeing vehicle shall be subject to braking tests on the downhill direction of the slope, and the sightseeing vehicle shall be capable of smooth stopping.

Note 4-3: In the regular (first-time) inspection, the maximum gradient downhill stop test shall be performed in the downhill direction using the maximum driving gradient in the field driving route. At the rated load of the sightseeing vehicle, when it is braked at the maximum operating speed, the sightseeing vehicles shall be able to stop smoothly.

4.3 Type test

4.3.1 General requirements

Field vehicle type test refers to the technical review, prototyping inspection, prototype test, etc., carried out by the type testing organization on whether or not the vehicle product satisfies the requirements of the safety technical specification on the basis of the completion of the product's comprehensive test verification, to verify its safety and reliability.

The field vehicles which are first manufactured by the manufacturer, the field vehicles which are manufactured overseas and first put into use in China, when the safety technical specifications propose new technical requirements, it shall perform type test.

The type testing agency shall conduct tests in accordance with the type, model (Note 4-4, Note 4-5) and specifications (main parameters, Note 4-6) of the field vehicle. Different models of products of the same type shall be subject to type test respectively, for the same models of products of the same type, its main parameters are covering from high to low.

Note 4-4: The model number of a motorized industrial vehicle refers to the code of a model with the same power mode and transmission mode. Its code number is generally composed of the product variety name, power mode, and transmission mode, and is expressed in the form of letters or a combination of letters and numbers.

Note 4-5: The model of sightseeing vehicle refers to the code of a model with

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